

ORIGINAL ARTICLE

REM Desensitization as a New Therapeutic Method for Post-Traumatic Stress Disorder: A Randomized Controlled Trial

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ABSTRAK

Tujuan: menilai potensi efikasi suatu pendekatan terapi baru untuk gangguan stress paska-trauma dan membandingkannya dengan pendekatan “eye movement desensitization and reprocessing” (EMDR), yang merupakan pendekatan terapi baku dan kelompok control. **Metode:** penelitian ini dirancang menggunakan metode penelitian uji klinik acak terkontrol. Peserta penelitian yang ikut berpartisipasi adalah anggota militer yang berusia 25-50 tahun yang dirawat di RS Bushehr, Iran dengan diagnosis akhir PTSD. Selanjutnya, 33 pasien laki-laki ikut serta dalam penelitian ini dan dibagi ke dalam tiga kelompok: G1: EMDR; G2: Desensitisasi REM; dan grup 3: subyek kontrol yang tidak mendapatkan terapi. Penilaian dilakukan dengan menggunakan indeks penilaian dari “Mississippi Scale for Posttraumatic Stress Disorder, Pittsburgh Sleep Quality Index (PSQI)” serta kuesioner ansietas yakni “death anxiety questionnaire” yang berisi 37 butir pertanyaan. **Hasil:** perbandingan multipel menunjukkan bahwa pikiran yang mengganggu (intrusive thought) tampaknya membaik secara bermakna dengan desensitisasi REM dibandingkan EMDR ($p=0,03$), sedangkan depresi lebih responsive terhadap EMDR ($p=0,03$). Di antara butir-butir pertanyaan tentang skala kualitas tidur dari “Pittsburgh scale”, kualitas tidur ($p=0,02$), durasi tidur ($p=0,001$) dan skor total kualitas tidur ($p=0,002$) tampaknya membaik secara bermakna pada kelompok desensitisasi REM. Perubahan pada skor ansietas kematian absolut (absolute death anxiety scores) tidak berbeda antara kelompok yang mendapatkan EMDR dibandingkan dengan kelompok kontrol ($p=0,05$). **Kesimpulan:** desensitisasi REM, suatu pendekatan terapi baru untuk PTSD ternyata merupakan strategi yang sangat efektif, bahkan lebih baik daripada EMDR yang merupakan terapi baku untuk gangguan tersebut, pada sebagian besar subyek penelitian dengan penekanan pada gejala-gejala tidur dan juga pada penatalaksanaan pikiran yang mengganggu. Depresi merupakan satu-satunya faktor dengan Desensitisasi REM yang secara bermakna mempunyai efek terapi yang tidak lebih baik dibandingkan dengan EMDR.

Kata kunci: gangguan stress paska-trauma/post traumatic stress disorder (PTSD), eye movement desensitization and reprocessing, terapi baru.

ABSTRACT

Aim: to evaluate potential efficacy of a new therapeutic approach in posttraumatic stress disorder in comparison with eye movement desensitization and reprocessing (EMDR), a standard treatment approach and

controls. **Methods:** the study was designed using a randomized controlled trial methodology. Participants were recruited from military servicemen aged between 25 to 50 years who were admitting hospitals of Bushehr, Iran, with the final diagnosis of PTSD. Finally 33 male patients were divided into three subgroups: G1: EMDR; G2: REM Desensitization; and group 3: controls who received no therapy. Mississippi Scale for Posttraumatic Stress Disorder, Pittsburgh Sleep Quality Index (PSQI) and a 37 item death anxiety questionnaire were used for measures. **Results:** multiple comparisons showed that intrusive thoughts were significantly more likely to improve with REM Desensitization versus EMDR ($P=0.03$), while depression was more responsive to EMDR ($p=0.03$). Among the Pittsburgh scale for the quality of sleep items, sleep quality ($p=0.02$), sleep duration ($p=0.001$), and total sleep quality score ($p=0.002$) were significantly more likely to improve in the REM Desensitization group. Change in the absolute death anxiety scores was not different between subgroups excepting EMDR versus control group ($p=0.05$). **Conclusion:** REM, desensitization, the new therapeutic approach to PTSD is a highly effective strategy, even more than EMDR, the standard treatment, in most of the evaluated subjects, with special emphasis on sleep symptoms, and also in the management of intrusive thoughts. Depression is the only factor in which, REM Desensitization was significantly less likely to represent a superior therapeutic effect than EMDR.

Key words: post traumatic stress disorder (PTSD), eye movement desensitization and reprocessing, new treatment.

INTRODUCTION

Individuals in military services are at a wide range of threats of different kind that affect their health and well-being;^{1,2} they are also at much greater risk of witnessing traumatic events than are ordinary citizens, and for the same reason, they are highly more likely to develop posttraumatic stress disorder (PTSD). PTSD is a significant concern in the health of personnel of military services with its profound effect on the patients' health status as well as their public relations and capacity to adapt to the world outside.³

Through the recent 2 or 3 decades, PTSD has become the main attention point to several therapeutic outcome surveys.^{4,5} The general presumption in the desensitizing management of traumatic memory is that the physician should activate the sense of fear during treatment sessions.^{6,7} Among these therapeutic strategies, eye movement desensitization and reprocessing (EMDR) proposed by Shapiro⁸ has been documented as the first line treatment approach in chronic PTSD in some countries;⁹ nevertheless, this still is considered a controversial method in the management of PTSD. This technique involves tracking of ocular movements during hand movements while the patient holds a scene of the traumatic event in mind. In this technique, after exposure to the traumatic memory, patients' emotional arousal and imagination is violated

by employing a distracter, the moving hand in EMDR, and interruption of attention which leads to prevention of sustained arousal, and counter-conditioning.^{10,11}

Desensitization has also been performed through several other strategies including using a non-terrifying stimuli and distraction of any kind such as kinesthetic or auditive stimuli alongside short-term periods of exposure;¹² or application of repetitive stimuli which has been proposed to elicit a relaxation response.^{13,14}

Alongside flashbacks, irrational beliefs, intrusive thoughts, and high fear levels; sleep disturbance is usually categorized among the secondary symptoms of PTSD. Its high relevance compared to all others lies on its critical role in regulating proper processing of the traumatic memories, and rapid eye movement (REM) sleep in particular provides appropriate conditions for this process of memory transfer and integration of traumatic and stressful memories to perform.¹⁵ Despite the relevance of sleep components in the pathogenesis of PTSD, there has been very little evidence of any trial to use sleep-based interventions in the treatment of PTSD. In the current study, we present our unique experience with the management of PTSD through a new approach concerning the rapid eye movement (REM) sleep in Iranian veterans with confirmed diagnosis of chronic PTSD.

METHODS

Study Design

The study was designed using a randomized controlled trial methodology. Subjects were recruited from military servicemen aged between 25 to 50 years who were admitting hospitals of Bushehr, Iran, with the final diagnosis of PTSD, due to participation in military conflicts including war games. All the patients had at least one course of inpatient hospital admission due to PTSD. To perform the diagnosis, after attending the hospital, all subjects underwent full psychological evaluations, and upon the initial diagnosis, all of them who firstly taken medications. The medications used for these patients included selective serotonin reuptake inhibitors (SSRIs) and 2nd generation of neuroleptic agents. None of the patients received electroconvulsive therapy (ECT). None of the subjects were addicted.

Inclusion and Exclusion Criteria

All the participants should be of male gender. PTSD in the participants must be due to exposure to military accidents. The range of age in the study participants should be between 25-50 years. All the participants should eagerly give informed consent to participate. All the patients should be under pharmaceutical therapy with the abovementioned agents. The study subjects

were excluded from the study if: (1) they had not a satisfactory cooperation to the research authorities and not adhering to the research protocol; (2) having simultaneous physical or psychological problems that interferes the study process; (3) appeal to exit the study by the participant; and (4) none of the patients should have had the history of therapy with ECT.

Sampling

During the autumn and winter 2012, 53 men, all personnel of marine forces of Bushehr were eligible to enter the study, from which 48 gave informed consent to the study. PTSD in all the subjects had been developed due to a combat-related event. They were randomly assigned to 3 subgroups, each including 16 subjects: Group 1: those undergoing EMDR; group 2: being treated with REM desensitization; and group 3: controls who received no therapy. From the group 2, 6 participants excluded from the study for the following reasons: 4 could not tolerate the glasses during the night-sleep; one developed allergy to the glasses, and one without explanation. From groups 1 and 3, also 5 and 4 patients, respectively, refused to continue the study to the end, without any notable reasons.

Measures

Diagnosis of PTSD and depression in all the participants has been confirmed by a third party

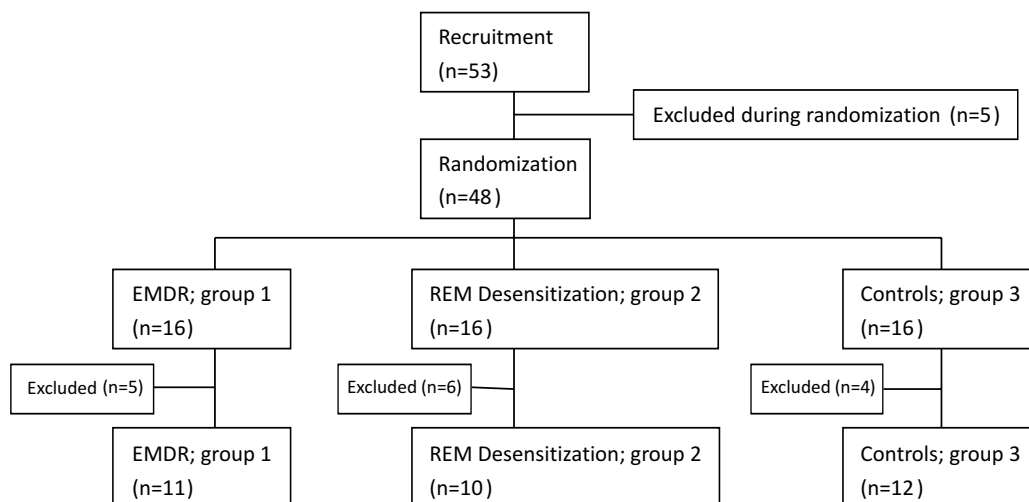


Figure 1. Consort flow diagram of the current randomized controlled trial

psychologist based on the Structured Clinical Interview for DSM-III-R (when available), and a score greater than 107 on the Mississippi Scale for Posttraumatic Stress Disorder (Which has been shown to represent excellent diagnostic sensitivity and high specificity) was diagnostic (The validated Persian version was used in the current study).¹⁶ That same scaling procedure has also been used as a continuous measure of PTSD severity.

Sleep quality has been evaluated using the validated Persian version of Pittsburgh sleep quality index (PSQI).¹⁷ The PSQI questionnaire consists of seven items that focus on seven components of sleep quality reported by PTSD patients including: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, hypnotic medication use, and daytime dysfunction. Each of the mentioned components has a scoring range of 0-3, yielding a global score of 0-21, with higher score representing greater sleep complaints. Patients with a global PSQI scores of greater than 5 were defined as 'poor sleepers', according to the recommendations.

Death anxiety questionnaire, a 37 item, self rating questionnaire, has been used for evaluating the rate of death anxiety among the participants.¹⁸ The total questionnaire scoring interpretation was this way: Participants with total scores below 40 were considered low death anxiety intensity, scores 40-64 were considered moderate, and scores ≥ 65 were considered severe.

Intervention protocols

The EMDR procedure has been very well described by the developer before.⁸

Procedure of REM desensitization: The clients were asked to wear light and flexible glasses, which would make no unease for the sleep on their eyes. These glasses possess sensors with the ability to detect infrared waves that during the rapid eye movements (REM) period of the sleep would be activated and reactivates a musical instrument which delivers a light music for a period of 30 seconds with 75 Watts of energy, that would not make any serious disturbance to the clients' sleep process. It should be noted that the same music (with or without the use of visual tools

like enjoyable and/or soothing images with the selection of the client himself) should have been used before this stage in at least 3 desensitization sessions. So the patients would be conditionalized for that light music to desensitize the patient during the nightmares. The subjects were also asked that during their sleep and when the music is played, if they become aware of their sleep, they try to continue with their nightmare, and try to face the scene without fear and confront the situation to the highest degree.

Statistical Analysis

Software SPSS version 17.0 (SPSS Inc, Chicago, IL, USA) has been used for analyses. Chi square test was used for analyzing categorical data. One-way ANOVA has been used for comparing continuous variables between the three study groups, and Tukey's test was used for multiple comparisons. P value < 0.05 was considered significant.

RESULTS

Overall, 33 personnel of armed forces of Iran have finally participated the study. All of the participants were male. Mean \pm SD age of the study subjects was 29.9 ± 7.8 years. Demography of the education level was as follows: Diploma 13(39.4%), pre-bachelor 9(27.3%) and bachelor or higher 11(33.3%). 24 (72.7%) of the study participants were married at the time of evaluations. The military degrees of the study population were as: Lower than sergeant 13(39.4%), sergeant to lieutenant 18(54.5%), and higher than lieutenant 2(6.1%). None of the participants had any injury at the stage in which they developed PTSD. Demographic data of the study population with regard to the study groups is presented in **Table 1**.

Among the subscales of Mississippi Scale for PTSD, all of them showed significant difference in the study groups: changes in scores of intrusion ($p=0.001$), inter-personal relation disturbance ($p=0.014$), inability to emotional control ($p<0.001$), depression ($p=0.002$), and Mississippi scale total score ($p<0.001$). **Table 2** summarizes data of the study groups regarding their Mississippi scale for PTSD, and the results of multiple comparisons.

Table 1. Baseline demographic data of the study participants according to the study groups

Variables	EMDR	REM	Controls
Gender male (%)	11(100)	10(100)	12(100)
Age (mean±SD)	29.4±6.8	30.8±6.9	29.8±9.7
Education level (%)			
- Diploma	4(36.4)	3(30)	6(50)
- Pre-bachelor	3(27.3)	3(30)	3(25)
- Bachelor	4(36.4)	4(40)	3(25)
Marital status (married %)	8(72.7)	8(80)	8(66.7)
Officer degree			
- Lower than sergeant	4(36.4)	3(30)	6(50)
- Sergeant to lieutenant	7(63.6)	5(50)	6(50)
- Higher than lieutenant	0	2(20)	0

Changes in the subscales of the Pittsburg sleep quality after the study performance were also significantly different regarding the study groups: sleep quality ($p<0.001$), sleep latency

($p<0.001$), sleep duration ($p<0.001$), sleep medication ($p=0.003$), daytime dysfunction ($p=0.005$), and total sleep quality scale ($p<0.001$); nevertheless, there was no significant difference between the study groups regarding habitual sleep efficiency ($p=0.142$) and sleep disturbance ($p=0.106$). **Table 3** shows data of the study groups regarding the Pittsburgh sleep quality scale, and the results of multiple comparisons.

At the initiation of the study, no participant had a score indicating a weak death anxiety intensity, while 7(21%) had moderate and 26 (79%) represented severe death anxiety scoring. However, after the study, 1(3%) subject had weak death anxiety score, 5 (15%) had moderate, and 27 (82%) had severe death anxiety scores. Crosstabulation and chi-square test showed no significant difference between the groups ($p=0.07$). Change in the absolute death anxiety scores were, however, significantly more prominent in the different groups, with less improvement in the control group (G1: -8.7 ± 11.4 ; G2: -8.1 ± 11.6 ; G3: 1.3 ± 6.5 ; $p=0.037$;

Table 2. Changes in the subscales of Mississippi Scale for Combat Related PTSD after intervention; and the results of multiple comparisons

Subscales	EMDR	REM	Controls	p	EMDR vs. REM	REM vs. Controls	EMDR vs. controls
Intrusive thoughts	-3.2±8.5	-10.7±6.7	0.08±2.0	0.001	0.03*	0.001*	0.43*
Interpersonal relation	-4.7±5.2	-1.3±2.7	-0.08±2.3	0.01	0.09	0.72	0.01
Emotional control	-5.3±4.4	-6.4±3.9	0.7±2.5	<0.001	0.76	<0.001	0.001
Depression	-6.2±4.1	-1.6±2.5	-0.08±4.4	0.002	0.03	0.63	0.002
Total score	-19.4±10.3	-20±9.5	0.6±5.9	<0.001	0.098	<0.001	<0.001

*p value after multiple comparisons (Tukey's test)

Table 3. Changes in the subscales of Pittsburgh scale for sleep quality after intervention; and the results of multiple comparisons

Subscales	EMDR	REM	Controls	p	EMDR vs. REM	REM vs. Controls	EMDR vs. controls
Sleep quality	-0.29±0.18	-0.5±0.17	-0.03±0.16	<0.001	0.02	0.08	0.002
Sleep latency	-0.21±0.15	-0.37±0.24	0.02±0.04	<0.001	0.079	<0.001	0.005
Sleep duration	-0.14±0.14	-0.47±0.3	0.01±0.03	<0.001	0.001	<0.001	0.17
sleep efficiency	-0.05±0.22	-0.16±0.09	0.01±0.21	0.142	-	-	-
Sleep disturbance	-0.04±0.46	-0.25±0.16	0.01±0.06	0.11	-	-	-
Sleep medication	-0.26±0.31	-0.41±0.46	0.16±0.34	0.003	0.63	0.003	0.03
Daytime dysfunction	-0.33±0.25	-0.25±0.44	0.15±0.29	0.005	0.86	0.03	0.007
Total sleep quality score	-1.3±0.95	-2.5±0.75	0.22±0.48	<0.001	0.002	<0.001	<0.001

*p value

multiple comparisons: G1 vs. G2 ($p=0.98$), G2 vs. G3 ($p=0.08$) & G1 vs. G3 ($p=0.05$)).

DISCUSSION

In this study, for the first time, we evaluated a new therapeutic strategy, the “REM Desensitization”, and its potential effect on the PTSD burden among Iranian armed forces, compared to EMDR, as the conventional treatment method used for PTSD patients; and controls who received no therapeutic method. Thirty three personnel of the Iranian armed forces who had confirmed diagnosis of PTSD finally completed this study that compared efficacy of the new method of REM Desensitization to EMDR and controls who received no treatment. The study showed that the new treatment has a superior efficacy both to the EMDR and control groups, in most sleep components as well as total PSQI score, but not in death anxiety. Among the Mississippi PTSD subscales, REM Desensitization was highly significantly more effective than the other two groups in reducing intrusion, while it was less effective than EMDR in reducing depression. Mississippi total score, however, was comparable between the EMDR and REM Desensitization groups.

The efficacy of different treatment approaches, including EMDR, in the management of PTSD has been reported in several reports.^{19,20} In fact, EMDR’s effectiveness in therapy of PTSD has been confirmed in several published controlled randomized trials, which have compared its efficacy with other forms of therapy including the medications and cognitive behavioral therapies. Systematic reviews and meta-analyses have also shown that the efficiency of EMDR in the management of PTSD is comparable to other efficacious treatments, including exposure therapy. A recent systematic review on the subject, evaluating 70 studies involving a total number of 4761 participants reported that EMDR were more effective than waitlist and/or usual care.²¹ No statistically significant difference was found between individual trauma-focused cognitive behavioural therapy (TFCBT), EMDR and Stress Management (SM) immediately after treatment; although at the follow up, individual TFCBT and EMDR were confirmed to be

superior to non-TFCBT, and TFCBT, EMDR and non-TFCBT were each individually more effective than other therapeutic methods.²¹

In the current study, consistent to the existing literature, EMDR was significantly associated with a significant improvement in almost every subscale of Mississippi scale for PTSD, except for intrusion, as well as Mississippi scale total score compared to the control group who received no treatment (**Table 2**). Similar observation has been made evaluating sleep quality subscales, and patients undergoing EMDR represented significant improvement in the subscales sleep quality, sleep latency, sleep medication, daytime dysfunction, and PSQI total score, but not in sleep duration, sleep efficiency, and sleep disturbance subscales compared to the control group (**Table 3**).

REM Desensitization, the new method having been used in this trial had even better efficacy in PTSD patients, than EMDR. This priority was most prominent in the quality of sleep subscales and less significant in the Mississippi scales; although even in the latter case, it was significantly more efficacious in intrusion symptoms, but less potent in improving depression, compared to the EMDR. The relevance of such a finding is very high; because, if the patients’ main complaint is intrusion, then REM Desensitization would be our therapeutic approach of priority; but if depression is the main dilemma, EMDR can be the first choice in the treatment of PTSD patients.

In a trial study of 22 PTSD patients, cognitive behavioral treatment (CBT) was reported to be successful in the management of intrusive memories;²² similar findings have been reported by other researches,²³⁻²⁵ while another study showed that EMDR and CBT are equally effective in the management of the PTSD symptomatology.²⁶ Pharmacotherapy has also been reported to be successful in the management of intrusive thoughts in PTSD patients.²⁷ Anticonvulsants, especially valproate, have been successfully used in the treatment of intrusive thoughts, potentially due to their enhancing effect on GABAergic and serotonergic neurotransmission.²⁸ Topiramate, another anticonvulsant, has also been effective in the

treatment of nightmares and intrusive thoughts either as a monotherapy or as an adjunctive treatment.²⁹ Propranolol, a non-selective beta-blocker,^{30,31} nalmefene, an oral opioid antagonist,³² and naltrexone, another opioid receptor antagonist,³³ are other pharmaceuticals having been reportedly used effectively in the management of intrusive thought in PTSD patients. Future studies are needed to compare REM Desensitization to pharmaceutical therapies regarding PTSD symptoms improvement.

Sleep disturbances have been reported in 70-87% of people suffering from PTSD which was associated with almost 50% increase in the corresponding rate in traumatized people not representing PTSD.³⁴ Several studies have investigated efficacy of different methods in the management of sleep disturbances in PTSD patients, with controversial results having been reported. Imagery rehearsal and cognitive-behavioral therapy has been successfully examined in the management of sleep disorders of PTSD patients in some trials.³⁵⁻⁴⁰ while these methods failed to represent any significant improving effect on the sleep of PTSD patients in some others.⁴¹⁻⁴³ EMDR has also been reportedly efficacious in the treatment of sleep disorders in PTSD patients.⁴⁴ The current study also showed a significant beneficial effect of EMDR on sleep symptoms of PTSD compared to the controls; nonetheless, this effect was significantly lesser than REM desensitization (**Table 3**).

This study has some limitations. The sample size, although larger than several previous studies, is limited and this may compromise the reliability of the findings. The drop-out rate from the study was also high comprising over 31% of the initial participants, which should be considered as a weakness point to the current study.

CONCLUSION

REM, desensitization, the new therapeutic approach to PTSD which has been introduced to the literature for the first time, according to this study, it is a highly effective strategy, even more than EMDR, the standard treatment for the problem, in most of the evaluated subjects, with special emphasis on sleep symptoms, and also in the management of intrusive thoughts.

Depression is the only factor in which, REM Desensitization was significantly less likely to represent a superior therapeutic effect than EMDR. Future studies with larger sample size by other authors are necessary to confirm our findings.

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